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SOME MOLLUSCA OF THE FAMILIES CERITHIOPSIDÆ,  
CERITHIIDÆ AND CYCLOSTREMATIDÆ FROM THE  
GULF OF CALIFORNIA AND ADJACENT WATERS \*

BY

FRED BAKER  
*San Diego, California*

G. D. HANNA  
*Curator, Department of Paleontology  
California Academy of Sciences*

AND

A. M. STRONG  
*Los Angeles, California*

This report follows the general plan of preceding ones of the series of papers dealing with the marine mollusca of the Gulf of California and adjacent waters. Publication of the series began in 1923 in volume 13 of the Proceedings of the Academy, and it is expected that additional families will be treated from time to time. Various collections have been used in the preparation of the present contribution but the expeditions the Academy sent to the Gulf and west Mexican waters in 1921, 1922 and 1925 contributed the bulk of the material.<sup>1</sup>

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<sup>1</sup> For itineraries of these expeditions see: SLEVIN, J. R., Proc. Calif. Acad. Sci., ser. 4, vol. 12, No. 6, 1923 pp. 55-72.—HANNA, G. D., op. cit., vol. 14, No. 12, 1925, pp. 217-275, pls. 15-19.—HANNA, G. D., op. cit., vol. 15, No. 1, 1926, pp. 1-113, pls. 1-10, 7 text figs.

## Family CERITHIOPSISIDÆ

1. *Cerithiopsis* (*Cerithiopsis*) *grippi* Bartsch

*Cerithiopsis* (*Cerithiopsis*) *grippi* BARTSCH, Proc. U. S. Nat. Mus., vol. 52, 1917, p. 669, pl. 48, fig. 12.

Three specimens of this species were taken at Cape San Lucas, Lower California, and there is one in the Baker collection marked: "Gulf of California." Bartsch said in his original description: "The entire surface of the spire and the base is marked by very fine, incremental lines and much finer, spiral striations," but he failed to call attention to the fact that these lines cut the tubercles into quite well-defined sections, a characteristic of all specimens examined, including the type lot.

2. *Cerithiopsis* (*Cerithiopsis*) *oxys* Bartsch

*Cerithiopsis* (*Cerithiopsis*) *oxys* BARTSCH, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 332, pl. 36, fig. 2.

Taken at Agua Caliente and Cape San Lucas, Lower California.

3. *Cerithiopsis* (*Cerithiopsis*) *pupiformis* Carpenter

Plate 19, figure 1

*Cerithiopsis pupiformis* CARPENTER, Cat. Mazatlan Shells, 1857, pp. 443, 444.  
*Cerithiopsis* (*Cerithiopsis*) *pupiformis* Carpenter, BARTSCH, Proc. U. S. Nat. Mus., vol. 40, 1911, pp. 337, 338, pl. 38, figs. 1, 5.

Three specimens from Cape San Lucas, Lower California, seem to agree fully with the description of this species.

4. *Cerithiopsis* (*Cerithiopsis*) *subgloriosa* Baker,  
Hanna and Strong, new species

Plate 18, figure 7

Shell of medium size, regularly elongate-conic, milk white; nuclear whorls  $3\frac{3}{4}$ , the first small, mammillary, the rest very convex, smooth, separated by impressed sutures, regularly increasing in size and merging gradually into the postnuclear whorls; postnuclear whorls  $7\frac{1}{2}$ , the earlier turns convex, becoming flatter below, marked by three very prominent spiral cords, the posterior small at first but gradually becoming slightly the largest, crossed by equally prominent, slightly retractive axial ribs extending strongly to the peripheral cord and very feebly over the base, 16 appearing on the first turn, 18 on the second and 22 on the seventh, the spiral cords being sharply truncated anteriorly and posteriorly, rendering them distinctly rectangular between the tubercles; axial ribs more rounded, the intersections marked by roundish tubercles, truncated posteriorly and occasionally subcuspidate; spiral

cords nearly equally spaced, the middle cord being slightly nearer the posterior than the anterior; spaces included between the spiral cords and axial ribs forming deep pits, generally irregular in shape but tending to become squarish on the anterior whorls; sutures deeply impressed but not channeled, crossed prominently by the axial ribs which are not continuous; periphery marked by a spiral cord similar to the anterior one on the last turn, but much narrower and sharply truncated anteriorly into the slightly concave base; base marked by a low, narrow spiral cord about midway between the peripheral cord and the umbilical region, and everywhere crossed by the obsolete continuations of the axial ribs; aperture irregularly oval; outer and basal lips thin, corrugated by the external sculpture; columella strong, nearly vertical, sharply revolute, slightly concave, moderately calloused, obtusely angled at the beginning of the anterior canal; anterior canal short, reflected at an angle of about 45°; parietal wall marked by an extension of the external sculpture. Length, 3.93 mm.; diameter, 1.19 mm.

*Holotype*: No. 5453, C. A. S. Paleo Type Coll., and a half grown specimen from **Amortajada Bay, San Jose Island, Gulf of California**; collected by Fred Baker, 1921; two specimens from La Paz, Lower California in about four fathoms, and one from the "Gulf of California" taken by Geo. D. Porter.

The species is closely related to *Cerithiopsis gloriosa* Bartsch, but it is colored differently, is proportionately smaller, lacks the extension of the peripheral keel into the preceding sutures, the middle keel is closer to the posterior keel than to the anterior one, the axial ribs are slightly retractive instead of slightly protractive and the intercostal pits are much less distinctly defined than in *C. gloriosa*. These differential characteristics are well marked in all specimens taken.

### 5. *Cerithiopsis* (*Cerithiopsis*) *tuberculoides* Carpenter

Plate 19, figure 3

*Cerithiopsis tuberculoides* CARPENTER, Cat. Mazatlan shells, 1857, pp. 442, 443.

*Cerithiopsis* (*Cerithiopsis*) *tuberculoides* Carpenter, BARTSCH, Proc. U. S. Nat. Mus., vol. 40, 1911, pp. 336, 337, pl. 37, fig. 7.

Taken in three or four fathoms at La Paz, and Cape San Lucas, Lower California, and at Isthmus Bay, Espiritu Santo Island, Gulf of California.

### 6. *Cerithiopsis* (*Cerithiopsida*) *bristolæ* Baker, Hanna and Strong, new species

Plate 19, figure 4

Shell small, subpupiform, everywhere marked by minute, growth lines and equally fine, incised, spiral lines, shining, white throughout, except the tip of the columella and a narrow, reddish-brown, spiral band extending from the first remaining postnuclear whorl to the edge of the outer lip and covering the sutures and upper row of tubercles; nuclear whorls decollated; remaining postnuclear whorls, 4½, moderately rounded, marked throughout by three subequal and sub-

equally spaced, indistinctly defined, spiral cords, the posterior near the suture, the anterior separated from the suture by a space about equal to that dividing the anterior and median cords; spiral cords crossed by rather stronger, slightly retractive, axial ribs, about 16 appearing on the first whorl and 18 on the penultimate, the intersections marked by large, bead-like tubercles, somewhat broken up by the growth lines, and fine incised, spiral lines; spaces enclosed by the axial ribs and spiral cords irregular, but generally roundly oval, elongated spirally and becoming more quadrangular on the last whorl; periphery marked by a narrow, irregularly tuberculate cord; sutures moderately impressed and rendered indistinct by the crossing of the axial ribs; base rather long, slightly concave on the buccal side, evenly rounded behind, marked by two slender, diverging, tuberculate cords; aperture subpyriform, the anterior canal broad and open; outer and basal lips thin, crenulated by the external sculpture; columella revolute, covered by a callus extending over the parietal wall. Length, 1.17 mm.; diameter, .89 mm.

*Holotype*: No. 5457, C. A. S. Paleo. Type Coll., and three additional specimens, from Cape San Lucas, Lower California, collected by G. D. Hanna and E. K. Jordan, June, 1925.

The species closely resembles *Cerithiopsis cassi* of this paper from the same locality, especially in color pattern and general shape, but it differs very radically in the large, irregular tubercles, the rather broad, axial ribs and non-laminate spiral cords, and the smaller, ill-defined, rounded or oval interspaces, which are large, squarish and well defined in *C. cassi*. The peculiar cutting up of the tubercles by the growth lines and spiral incised lines is very characteristic, a condition shown in less degree in *C. grippi*.

The species is named for Miss Viola Bristol of Point Loma, California.

### 7. *Cerithiopsis (Cerithiopsida) cassi* Baker, Hanna and Strong, new species

Plate 19, figure 5

Shell minute, subpupiform, everywhere marked by almost imperceptible, incised spiral lines, blue-white, except a narrow, reddish-brown, spiral band covering the posterior row of tubercles, beginning on the first postnuclear whorl and continuing along the posterior cord and peripheral cord to the edge of the aperture; nuclear whorls two, the first smooth, mammillate, the second separated from it by an impressed suture, convex, showing the beginning of the sculpture of the succeeding postnuclear whorl; postnuclear whorls,  $4\frac{1}{2}$ , slightly convex, marked by three rows of minute, glistening, evenly rounded tubercles, nearly equal on the first two whorls, the posterior row becoming more prominent on the succeeding turns; tubercles united by very narrow, rather prominent, laminate, strongly retractive, axial ribs, and three almost equally prominent, laminate, spiral cords enclosing large and rather deep, squarish pits, much wider than the tubercles; tubercles numbering about 15 on the first whorl, 16 on the third and 18 on the last; spiral cords nearly equally spaced, the middle being slightly nearer the posterior than the anterior, the anterior separated from the suture by a space equal to that between it and the middle cord, this space being occupied by a series of squarish pits equal to the other intercostal spaces; axial ribs crossing the sutures prominently, rendering the impressed sutures rather indistinct; peripheral cord nearly equal to the preceding one,

its tubercles showing a slight tendency to become elongated spirally, extending into all the sutures as a very narrow, wavy cord, separated from the posterior row of tubercles by a minute, incised groove; base moderate, nearly straight, or showing a slight concavity in the umbilical region, marked by obsolescent sculpture similar to that on the body whorl; aperture irregularly ovate with a short, broad, anterior canal; columella nearly straight and vertical, heavily calloused, obliquely truncate anteriorly. Length, 1.99 mm.; diameter, 1.03 mm.

*Holotype*: No. 5458, C. A. S. Paleo. Type Coll., and two additional specimens, from **Cape San Lucas, Lower California**; collected by G. D. Hanna and E. K. Jordan, June, 1925; one specimen from Espiritu Santo Island, Gulf of California, is in the Baker collection.

In size and shape this species resembles *Cerithiopsis pupiformis* Carpenter, but differs in the color band, the small size of the tubercles, the rather extreme width of the squarish, intercostal pits and in having a peripheral cord instead of a sulcus. It seems distinct from all species described from this coast, except *C. bristolæ* of this paper, under which species the characteristic differences have been noted.

The species is named for Mr. Charles L. Cass of Pacific Beach, California.

### 8. *Cerithiopsis* (*Cerithiopsida*) *kinoi* Baker, Hanna and Strong, new species

Plate 18, figure 6

Shell small, slender, regularly elongate-conic, light chestnut brown; remaining nuclear whorls,  $2\frac{1}{2}$ , somewhat eroded, well rounded and separated by impressed sutures, colored like the rest of the shell, the last showing the tendency of the subgenus to develop sculpture similar to that of the postnuclear whorls; postnuclear whorls,  $7\frac{1}{2}$ , very moderately convex, marked by three narrow, prominent, nearly equally spaced, spiral cords, the first close to the upper suture, the third quite widely separated from the lower suture by a space about equalling that separating the spiral cords; the middle cord rather more prominent than the other two, all crossed by retractive axial ribs, nearly equal in size, and similar to the spiral cords, about 18 appearing on the first whorl, 20 on the fifth and 26 on the penultimate; intersections of the cords and ribs marked by small, rounded, beady tubercles tending to be spirally elongate at several points, the interspaces being generally marked by well-defined, deep, roundish pits tending to become squarish at some points on the lower whorls; interspaces between the lowest cord on each whorl and the suture marked by an almost identical series of roundish pits dipping into the suture and squarely defined below by a very narrow, sharp extension of the peripheral cord, appearing more or less distinctly in all the sutures, closely adnate to the succeeding whorls, and giving the appearance of a very narrow shoulder; sutures rather deeply impressed but largely obliterated by the extensions of the axial ribs; peripheral cord about equal to the preceding spiral cord but less tuberculate, the space above it about equal to that separating the other spiral cords; base rather short, well-rounded, marked by feeble extensions of the axial ribs, by one scarcely tuberculate cord beginning near the peripheral cord and gradually separating from it, and by an ill-defined columellar fasciole; aperture broadly, irregularly oval;

outer lip thin and crenulated by the external sculpture; basal lip horizontal and only slightly convex; anterior canal short, rather broad and oblique; columella nearly vertical, obliquely truncate below. Length, 3.25 mm.; diameter, .99 mm.

*Holotype*: No. 5451, C. A. S. Paleo. Type Coll., and five additional specimens from **Cape San Lucas, Lower California**; collected by G. D. Hanna and E. K. Jordan, June, 1925; one specimen from about four fathoms off La Paz, Lower California.

The species shows a very marked tendency of the upper row of tubercles to be carried to the left of a line connecting the corresponding lower two tubercles, thus bending the axial ribs retractively on each whorl. The same tendency shows on all the specimens seen, but in a varying degree. The species seems to be distinct from any heretofore described from this coast, being more closely allied to *Cerithiopsis bristolæ* and *C. cassi* of this paper, but differing from both in color, in the number of axial ribs, and in being more slenderly elongate-conic. It is intermediate between them in having the small tubercles and large intercostal pits of *C. cassi*, but differs from that species and resembles *C. bristolæ* in that the pits are roundish and not squarish.

The species is named for Fra Eusebio Francisco Kino, Jesuit pathfinder employed by the vice-regency of New Spain to survey the Gulf of California, in 1685. While engaged in this work he collected shells in that region. The species is named in accordance with the suggestion of Joshua L. Baily, Jr. (*Nautilus*, vol. 48, No. 3, January, 1935, p. 75).

#### 9. *Cerithiopsis* (*Cerithiopsida*) *kinoi* (subspecies?)

Plate 19, figure 6

A single specimen from Cape San Lucas, Lower California, is like *C. kinoi* of this paper, but varies in having the tubercles almost imperceptible, the intercostal pits rather larger and distinctly squarish, while the shell is broader in proportion to its height. We refrain from giving this shell a subspecific name, preferring to await further collecting to determine its validity.

#### 10. *Cerithiopsis* (*Cerithiopsida*) *porteri* Baker, Hanna and Strong, new species

Plate 19, figure 2

Shell very small, spindle-shaped, everywhere marked by minute growth lines and spiral incised lines, chestnut brown except the nucleus; nuclear whorls,  $4\frac{1}{2}$ , cream white, forming a high, narrow nucleus with a mammillated tip, the whorls well rounded and separated by moderately impressed sutures, the first turn and a half smooth, the rest showing both spiral and axial sculpture resembling that of the

succeeding turns; postnuclear whorls,  $6\frac{1}{2}$ , very slightly convex, rather low between the sutures, marked by two very prominent, widely separated, heavily tuberculate, spiral cords with a third, minute, irregularly tuberculate, median cord showing very indefinitely on the last two whorls; spiral cords crossed by decidedly retractive axial ribs, generally not well defined, 16 appearing on the second whorl, 18 on the fourth and 20 on the penultimate turn; spiral cords about equal on the early whorls, the tubercles of the posterior cord elongated axially on the lower turns, rendering this cord by far the most prominent; tubercles of the anterior cord truncated rather sharply posteriorly on the last whorl; periphery marked by a moderate sulcus continuous with the last turn of the suture; base well rounded, marked by three very strong, basal cords, the first with large tubercles, the second rugose but not tuberculate, the third constituting a basal fasciole; sutures rather deep but rendered indistinct by the large tubercles and axial ribs; aperture subcircular, less rounded on the columellar side; outer lip showing the external sculpture, and marked on the edge by minute tubercles; anterior canal short and narrow; columella and parietal wall heavily calloused, the columellar callus reflected, free and minutely beaded on the edge. Length, 2.17 mm.; diameter, .596 mm.

*Holotype*: No. 5455, C. A. S. Paleo. Type Coll., and five additional specimens collected in the "Gulf of California" by George D. Porter.

By virtue of its small size and spindle shape this species falls into the group of *Cerithiopsis pupiformis* Carpenter and *C. cassi* of this paper, but differs from these and all other species described from this coast in having but two spiral cords, the minute, median cord noted, scarcely amounting to a spiral cord. Only the holotype retains the full nucleus. Among the other specimens there is considerable variation in the size of the tubercles and in the incidence of the minute mesial cord.

### 11. *Cerithiopsis (Cerithiopsidella) cosmia* Bartsch

*Cerithiopsis cosmia* BARTSCH, Proc. U. S. Nat. Mus., vol. 33, Oct. 23, 1907, pp. 180, 181.

*Cerithiopsis (Cerithiopsidella) cosmia* BARTSCH, Proc. U. S. Nat. Mus., vol. 40, 1911, pp. 348, 349, pl. 38, fig. 7.

A single specimen of this species in the Baker collection is labeled "Gulf of California," but as there is a possibility of error, this large addition to the known range of the species should not be accepted without further collections. Dall (Bull. 112, U. S. N. M., 1921, p. 143) gives the range Monterey, California, to San Bartolome Bay, Lower California.

### 12. *Seila assimilata* (C. B. Adams)

Plate 18, figure 5

*Cerithium assimilatum* C. B. ADAMS, Cat. Panama Shells, Ann. Lyc. Nat. Hist., New York, vol. 5, 1852, pp. 374-375, 533 (separate pp. 150-151).

This species was taken at Coyote Bay, Concepcion Bay, Puerto Escondido, La Paz, and Cape San Lucas, Lower California; at Amor-

tajada Bay, the salt works and the west anchorage, San Jose Island, and at Isthmus Bay, Espiritu Santo Island, Gulf of California.

We are unable to detect any difference between this species and *S. montereyensis* Bartsch, except that the specimens are much smaller, a feature noted by Bartsch. Bartsch's description does not seem to separate them positively in any other respect.

### 13. *Metaxia diadema* Bartsch

Plate 18, figure 8

*Metaxia diadema* BARTSCH, Proc. U. S. Nat. Mus., vol. 33, Oct. 23, 1907, pp. 182, 183.

Taken in San Francisquito Bay, Lower California, in about three fathoms.

### 14. *Metaxia convexa* (Carpenter)

Plate 18, figure 4

*Cerithiopsis convexa* Carpenter, Cat. Mazatlan Shells, 1857, p. 444.

A single specimen was collected by George D. Porter in the "Gulf of California" and additional ones at Maria Madre Island by the Expedition of 1925.

## Family CERITHIIDÆ

*Key to west American genera and subgenera of the family Cerithiidae*

Columella with an oblique median plication.....	<i>Clava</i>
Columella without a plication	
* Anterior canal distinct, nearly closed, strongly recurved.....	<i>Cerithium</i>
* Anterior canal short, open, straight or nearly so.....	<i>Potamides</i>
** Shell turriculated, with irregular ribs and varices.....	<i>Pirenella</i> <sup>2</sup>
** Shell subcylindrical, spirally grooved.....	<i>Liocerithium</i> <sup>2</sup>
* Anterior canal a narrow groove, outer lip thickened.....	<i>Cerithidea</i>
* Anterior canal undeveloped	
** Aperture effuse at the junction of the outer and basal lips.....	<i>Diastoma</i>
** Aperture oval, more or less channeled anteriorly.....	<i>Bittium</i> <sup>3</sup>
*** Postnuclear whorls with varices.....	<i>Bittium s. s.</i> <sup>2</sup>
*** Postnuclear whorls without varices	
**** Nuclear whorls with two spiral lirations.....	<i>Lirobittium</i> <sup>2</sup>
**** Nuclear whorls smooth	
**** Spiral sculpture predominating over the axial.....	<i>Stylidium</i> <sup>2</sup>
**** Spiral sculpture not predominating over the axial.....	<i>Sembittium</i> <sup>2</sup>
** Aperture effuse at the columellar base, a minute umbilical chink behind the columella.....	<i>Alabina</i>

<sup>2</sup> Subgenera.

<sup>3</sup> Key to the subgenera of *Bittium*, adapted from Bartsch, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 384.



15. *Alabina diomedea* Bartsch

*Alabina diomedea* BARTSCH, Proc. U. S. Nat. Mus., vol. 39, 1911, p. 413, pl. 62, fig. 1.

Two worn specimens of this species were obtained at Cape San Lucas, Lower California, and in the Baker collection there is a large number, collected in beach drift by George D. Porter on Espiritu Santo Island, Gulf of California. Also several hundred were collected along the surf line of the outer coast at Magdalena Bay by G. D. Hanna in 1922.

16. *Bittium mexicanum* Bartsch

*Bittium mexicanum* BARTSCH, Proc. U. S. Nat. Mus., vol. 40, 1911, pp. 412, 413, pl. 58, fig. 1.

Two specimens were taken by George D. Porter in the "Gulf of California."

17. *Cerithium alboliratum* Carpenter

Plate 17, figure 7

*Cerithium alboliratum* CARPENTER, Cat. Mazatlan Shells, 1857, p. 356.

The species was taken at Cape San Lucas, Lower California, and it is in the Baker collection from Espiritu Santo Island, in the Gulf.

18. *Cerithium maculosum* Kiener

Plate 17, figure 2

*Cerithium maculosum* KIENER, Icon. Coq. Viv., *Canaliferes*, pt. 1, 1841-1842, p. 36, pl. 13, fig. 3.

*Cerithium nebulosum* SOWERBY, Thes. Conch., vol. 2, 1855, *Cerithium*, p. 866, sp. 71, pl. 179, fig. 48; not PHILIPPI, 1851.

The species was taken at the salt works, Carmen Island; Coronado Island; the salt works and Amortajada Bay, San Jose Island; Isla Raza; San Francisco Island; San Marcos Island; Isthmus Bay, Espiritu Santo Island; Ceralbo Island; and Santa Catalina Islands, Gulf of California; at Cape San Lucas and La Paz, Lower California; and at Tepoca Bay and San Carlos Bay, Sonora.

19. *Cerithium stercus-muscarum* Valenciennes

Plate 17, figure 3

*Cerithium stercusmuscarum* VALENCIENNES, Voy., Humboldt & Bonpland, 1833 (1832), *Zool.*, vol. 2, p. 278.

*Cerithium irroratum* GOULD, C. B. ADAMS, Cat. Panama Shells, Ann. Lyc. Nat. Hist., New York, vol. 5, 1852, p. 378 (separate p. 154); not GOULD.

*Cerithium ocellatum* Bruguiere may be the same species, in which case this name would supersede that of Valenciennes. There is a lack of agreement as to their identity.

The species was taken in large numbers in the broken drain pipes on the beach, south of the main wharf, at La Paz; at Coyote Bay; Concepcion Bay; Angeles Bay; Agua Verde Bay; Las Animas Bay; San Luis Gonzaga Bay; and Mulege Harbor, Lower California; at Guaymas, Sonora; and on Isla Raza; San Luis Island; Marquer Bay, Carmen Island; west anchorage, San Jose Island; Angel de la Guardia Island; and Monserrate Island, Gulf of California.

20. *Cerithium uncinatum* (Gmelin)

Plate 17, figure 1

*Murex uncinatus* GMELIN, Syst. Nat. Ed. 13, vol. 1, pt. 6, 1790, p. 3542, no. 57.

*Cerithium famelicum* C. B. ADAMS, Cat. Panama Shells, Ann. Lyc. Nat. Hist., New York, vol. 5, 1852, pp. 376, 533 (separate p. 152).

The species was taken at Ballandra Bay, Carmen Island; west landing, San Jose Island; and San Marcos Island, Gulf of California.

21. *Clava gemmata* (Hinds)

Plate 17, figure 5

*Vertagus gemmatus* HINDS, Voy. *Sulphur*, Moll., 1844, p. 27, pl. 11, fig. 5, 6.

*Clava californica* DALL, Proc. U. S. Nat. Mus., vol. 56, Aug. 30, 1919, p. 346.

Specimens were taken at the west anchorage, Amortajada Bay and the salt works, San Jose Island, Gulf of California; and at Cape San Lucas, Lower California.

Carpenter (Rep. Brit. Assoc., 1856, p. 170) suggested that *Cerithium fragaria* Valenciennes may be the young of this species. If this should prove correct, the latter name would take precedence.

22. **Potamides (Liocerithium) sculptus** (Sowerby)

Plate 17, figure 6

*Lampania sculpta* SOWERBY, Thes. Conch., vol. 2, 1855, p. 868, fig. 144, 145.

*Lampania incisa* SOWERBY, Thes. Conch., vol. 2, 1855, p. 868, fig. 152.

*Lampania curta* SOWERBY, Thes. Conch., vol. 2, 1855, p. 869, fig. 153, 154.

The species was taken at Coronado Island; Isla Raza; San Marcos Island; Georges Island; salt works and Marquer Bay, Carmen Island; west anchorage, San Jose Island; northeast anchorage, Monserrate Island; second anchorage, Tiburon Island; Isthmus Cove, Espiritu Santo Island; first anchorage, Santa Catalina Island; Smith Island; Isla Partida; San Luis Island; San Francisco Island; San Esteban Island; San Diego Island; Sal si puedes Island; Pond Island Bay and Puerto Refugio, Angel de la Guardia Island; and Danzante Island, Gulf of California; at San Luis Gonzaga Bay; San Francisquito Bay; Agua Verde Bay; Angeles Bay; Las Animas Bay; San Antonio Point and La Paz, Lower California; and at Tepoca Bay; San Carlos Bay; and Guaymas, Sonora.

23. **Cerithidea albonodosa** Carpenter

Plate 17, figure 4

*Cerithidea albonodosa* CARPENTER, Proc. Zool. Soc. London, July 8, 1856, p. 205.

Taken at northeast anchorage, Monserrate Island; San Luis Island, and at nearly every sand beach visited in the Gulf of California.

24. **Cerithidea albonodosa mazatlanica** Carpenter

*Cerithidea varicosa* SOWERBY, var. *mazatlanica* CARPENTER, Cat. Mazatlan Shells, 1857, pp. 344, 345.

Taken at Pond Island, Gulf of California.

*Cerithidea dæmonia* Dall, (manuscript name) from the Gulf of California, which has been widely distributed to collectors, proves to be a very dark color form of this subspecies.

25. **Cerithium montagnei** (d'Orbigny)

Plate 18, figures 1, 2

*Cerithium montagnei* D'ORBIGNY, Voy. Amér. Mérid., vol. 5, 1841, p. 443, pl. 63, figs. 3, 4.

*Cerithium reevianum* C. B. ADAMS, Cat. Panama Shells, Ann. Lyc. Nat. Hist., New York, vol. 5, 1852, pp. 380, 534 (separate p. 156).

Many excellent specimens of this beautiful species were taken at San Ignacio Lagoon, Lower California, by Henry Hemphill. These

agree in all essential details with d'Orbigny's original figure. Seven excellent specimens were taken by L. G. Hertlein at Tenecatita Bay, Jalisco, Mexico.

## 26. *Cerithidea fortiuscula* (Bayle)

Plate 18, figure 3

*Cerithium fortiusculum* BAYLE, Journ. Conchyl., vol. 28 (ser. 3, vol. 20, no. 3), 1880, p. 250.—TYRON, Man. Conch. vol. 9, 1887, p. 161, pl. 33, fig. 58.

One immature shell was taken at the northeast anchorage, Monserrate Island, Gulf of California, and an adult was found at Las Animas Bay on the peninsula. The species seems to have no very close relationship with *montagnei*, with which it has been associated by some writers.

## Family CYCLOSTREMATIDÆ

In the present paper the arrangement of genera and species used by Dall in Bulletin 112, U. S. National Museum, for the California shells has been expanded to include the species occurring below San Diego. Two changes have been made, the first in the use of the family name of *Cyclostrematidæ* instead of *Vitrinellidæ*. The genus *Cyclostrema*<sup>4</sup> is credited to Marryatt in 1818 and the genus *Vitrinella*<sup>5</sup> to C. B. Adams in 1850. We have followed the rule for forming the family name from the first described genus. The second change is in the use of the genus *Delphinoidea* Brown, 1827,<sup>6</sup> instead of *Cyclostremella* Bush, 1897.<sup>7</sup> The former name seems to be valid, and the type of the genus is more like our shells than is the case with that of the later genus.

C. B. Adams described a number of species in the family from Panama, and Carpenter several from Mazatlan, few of which can be retained in the genera in which they were described. The shell characters which we have used in arranging the west coast species in the various genera are shown in the following key. Nearly all of the species described by Adams and Carpenter are unfigured and the types are not available for comparison. In order to attempt an identification of our shells it was necessary to compare their descriptions with the descriptions and figures of Dall and Bartsch. The result of this study is shown in the keys to the species which we have placed in the various genera. These include everything from the west coast for which we found a record. Since the keys are based

<sup>4</sup> Trans. Linn. Soc., London, vol. 12, 1818, p. 338.

<sup>5</sup> Mono. *Vitrinella*, 1850, p. 3.

<sup>6</sup> Illust. Conch. Gr. Brit. Ireland, 1827, p. 4.

<sup>7</sup> Trans. Conn. Acad. Arts and Sci. vol. 10, pt. 1, 1897, p. 140. Monotype, *C. humulis* Bush, op. cit., p. 141, pl. 22, figs. 8-8b.

very largely on the written descriptions, and not on the shells themselves, they must be considered as provisional.

A number of small series or single specimens in the Academy's collection do not seem to agree with any of the forms described from the Gulf of California but some of them are more or less similar to forms described from distant localities. Rather than extend ranges from the meager data available, it seemed better to describe them as new. If larger series of specimens and specimens from intermediate points show the differences to be individual variations, the figures and full descriptions should still be of value.

*Key to west American genera of the family Cyclostrematidæ*

- Base with a callus pad restricting or covering the umbilicus..... *Teinostoma*
- Base openly umbilicated, without a callus
  - \* Shell naticoid, spire elevated..... *Ganesa*
  - \* Shell flattened, spire low or sunken
    - \*\* Outer lip sinuated or waved..... *Scissilabra*
    - \*\* Outer lip not sinuated or waved
      - \*\*\* Spiral sculpture absent..... *Vitrinella*
      - \*\*\* Spiral sculpture present
        - \*\*\*\* Whorls rounded, with many equal spiral cords of incised lines.. *Delphinoidea*
        - \*\*\*\* Whorls angulated, with a few sharp spiral keels
          - \*\*\*\*\* Axial sculpture present..... *Cyclostrema*
          - \*\*\*\*\* Axial sculpture absent..... *Circulus*

*Key to west American species of the genus Ganesa*

- Umbilicus bounded by a conspicuous keel; diam., 1.2 mm.
  - Mazatlan..... *naticoides* Carpenter
- Umbilicus bordered by from 12 to 15 spiral striae; diam., 4.5 mm.
  - Panama..... *panamensis* Dall
- Umbilicus not emarginated
  - \* Entire surface with subgranular vermiculations; diam., 2 mm.
    - Galapagos Islands..... *piona* Dall
  - \* Entire surface with thread like axial folds; diam., 2.5 mm.
    - Galapagos Islands..... *filosa* Dall

*Key to west American species of the genus Teinostoma*

- Umbilicus entirely covered by a smooth callus pad
  - \* Body whorl with a furrow and keel near the suture; diam., 2 mm.
    - Monterey to Gulf of Calif..... *supravallata* Carpenter
  - \* Body whorl acutely carinated below the periphery; diam., 1 mm.
    - Mazatlan..... *carinata* Carpenter
  - \* Body whorl angulated at the center of the base; diam., 2 mm.
    - Monterey to the Gulf of Calif..... *invalata* Carpenter
  - \* Body whorl evenly rounded
    - \*\* Surface with finely decussated sculpture; diam., 1.2 mm. Mazatlan..... *pyricallosa* Carpenter
    - \*\* Surface with subrugose spiral striae; diam., 1.1 mm. Mazatlan..... *pallidula* Carpenter

- \*\* Surface with subobsolete spiral striae; diam., 1 mm. Mazatlan  
.....*tumens* Carpenter
- \*\* Surface without sculpture;
- \*\*\* Callus pad spiral, flattened toward the inner lip; diam., 2.75 mm.  
Mazatlan.....*amplectans* Carpenter
- \*\*\* Callus pad rounded, smooth; diam., 3.5 mm. Magdalena Bay. *cecinnella* Dall
- Callus pad showing an umbilical indentation or dimple
  - \* Umbilicus deeply indented; diam., 1.8 mm. Panama.....*regularis* Adams
  - \* Umbilical dimple minute; diam., 1.8 mm. Coronados Islands. *salvania* Dall
- Callus pad leaving a slight umbilical chink
  - \* Surface with fine spiral striations; diam., 1 mm. Mazatlan. *lirulata* Carpenter
  - \* Surface without sculpture
  - \*\* With a large, ovate pad behind the pillar lip; diam., 2 mm. San  
Pedro.....*sapiella* Dall
  - \*\* With a small, linguiform pad only; diam., 2 mm. San Diego...*bibbiana* Dall
  - \*\* With a semi-lunular pad; diam., 1 mm. Mazatlan.....*amplectans* Carpenter
- Callus pad curving around an open umbilicus
  - \* Body whorl subangulated at the periphery; diam., 1 mm. Panama  
.....*minuta* Adams
  - \* Body whorl evenly rounded; diam., 1 mm. Mazatlan. *substriata* Carpenter

*Key to west American species of the genus Scissilabra*

- Axial sculpture present
  - \* Body whorls with 4 spiral keels; diam., 1.25 mm. Mazatlan to  
Panama.....*parva* Adams
  - \* Body whorl with 5 spiral keels; diam., 1.6 mm. Mazatlan to  
Panama.....*panamensis* Adams
  - \* Body whorl with finely decussated sculpture
  - \*\* Shell subelevated; diam., 1.4 mm. Mazatlan.....*monile* Carpenter
  - \*\* Shell discoidal; diam., 1 mm. Mazatlan.....*monilifera* Carpenter
- Axial sculpture absent
  - \* Body whorl sharply angulated at periphery; diam., 2 mm.  
Monterey to Gulf of Calif.....*dalli* Bartsch
  - \* Body whorl subangulated below the periphery; diam., 1 mm.  
Mazatlan.....*subquadrata* Carpenter
- Body whorl evenly rounded
  - \*\* Body whorl with uniform spiral striae; diam., 1.4 mm. Mazatlan  
.....*bifilata* Carpenter
  - \*\* Spiral striae at periphery only; diam. 0.8 mm. Mazatlan...*orbis* Carpenter

*Key to west American species of the genus Vitrinella*

- Umbilical walls smooth (*Vitrinella* s. s.)
  - \* Surface with distinct, irregular impressed lines; diam., 2.1 mm.  
Cayucos to Pt. Abreojos.....*oldroydi* Bartsch
  - \* Surface with distinct, regular lines of growth; diam., 1.2 mm.  
San Pedro.....*smithi* Bartsch
  - \* Surface smooth and glossy
  - \*\* Shell subglobose, spire somewhat elevated; diam., 1.6 mm.  
Unalaska.....*alaskensis* Bartsch
  - \*\* Shell flattened, spire little elevated; diam., 2.3 mm. San Pedro  
.....*eschnauri* Bartsch
  - \*\* Shell discoidal, spire depressed; diam., 5.5 mm. San Pedro  
.....*williamsoni* Dall

Umbilical walls with oblique ribs or notches (*Decomphala*)

- \* Base with a single spiral keel; diam., 2.2 mm. Monterey to San Diego.....*berryi* Bartsch
- \* Base without keels
- \*\* Upper whorls axially ribbed; diam., 3.8 mm. Monterey to Reef Pt. ....*stearnsi* Bartsch
- \*\* Upper whorls marked by lines of growth only; diam., 1.5 mm. Departure Bay, B. C. ....*columbiana* Bartsch

*Key to west American species of the genus Delphinoidea*

Surface with raised spiral threads

- \* Whorls slightly constricted at regular intervals; diam., 2.3 mm. Monterey to San Diego.....*californica* Bartsch
- \* Whorls with a ripple marked aspect; diam., 1.3 mm. Gulf of Calif. ....*dalli* Bartsch
- \* Interstices between threads axially striated
- \*\* Shell minute; diam., 2 mm. Panama.....*ponceliana* de Folin
- \*\* Shell large for the genus; diam., 5 mm. Cape San Lucas.. *granti* B. H. and S.
- \* Spiral threads regularly and finely beaded; diam., 2 mm. Olga, Wash. ....*concordia* Bartsch
- \* Sculpture on last whorl finely decussated; diam., 1 mm. Mazatlan .....*decussata* Carpenter
- \* Spiral threads and interspaces smooth
- \*\* A smooth band between suture and first spiral; diam., 1.5 mm. Cape San Lucas.....*lucasana* B. H. and S.
- \*\* Spiral threads subequally spaced
- \*\*\* Shell moderately elevated
- \*\*\*\* Spiral threads on last whorl about 15; diam., 1.2 mm. Gulf of Calif. ....*spiritualis* B. H. and S.
- \*\*\*\* Spiral threads on last whorl about 50; diam., 1.6 mm. Tres Marias Islands.....*stephensæ* B. H. and S.
- \*\*\* Shell depressed turbinate; diam., 2 mm. San Diego.....*rossellina* Dall
- \*\*\* Shell discoidal; diam., 2.1 mm. Mazatlan.....*lirulata* Carpenter

Surface with incised spiral lines

- \* Incised lines on both spire and base; diam., 0.85 mm. Cook Inlet, Alaska.....*alaskana* Bartsch
- \* Incised lines strong on base only; diam., 1.5 mm. Panama.. *seminuda* Adams

*Key to west American species of the genus Cyclostrema*

Space between keels spirally sculptured

- \* Three spiral keels on body whorl
- \*\* Two of keels on periphery, one on base; diam., 4.5 mm. San Pedro to Gulf of Calif.....*baldrigei* Bartsch
- \*\* All keels on the periphery; diam., 3.97 mm. Gulf of Calif. ....*spiciferi* B. H. and S.
- \* Four spiral keels on the body whorl; diam., 1.5 mm. Mazatlan to Panama.....*exigua* Adams
- \* Five spiral keels on the body whorl; diam., 2.28 mm. Tres Marias Islands.....*mariaæ* B. H. and S.

Space between keels not spirally sculptured

- \* Three spiral keels on the body whorl
- \*\* Upper keel nodulous; diam., 0.8 mm. Mazatlan.....*nodosa* Carpenter
- \*\* All keels smooth
- \*\*\* A strong spiral keel on the periphery; diam., 1 mm. San Diego .....*diegensis* Bartsch

- \*\*\* A spiral keel on each side of the periphery; diam., 0.9 mm.  
Panama . . . . . *perparva* Adams
- \* Four spiral keels on the body whorl
- \*\* Upper keel nodulous; diam., 1.4 mm. Mazatlan . . . . . *coronata* Carpenter
- \*\* All keels smooth; diam., 1 mm. Panama . . . . . *janus* Adams
- \* Five spiral keels on body whorl
- \*\* Two keels on periphery, three on base; diam., 1.4 mm. Cape San  
Lucas . . . . . *xantusi* Bartsch
- \*\* Three keels on periphery, two on base
- \*\*\* Axial riblets reaching the umbilicus; diam., 2.1 mm. San Pedro  
. . . . . *miranda* Bartsch
- \*\*\* Axial riblets becoming obsolete on base; diam., 1.5 mm. Panama  
. . . . . *concinna* Adams
- \* Six spiral keels on the body whorl
- \*\* Axial nearly equalling the spiral keels in strength; diam., 1.3  
mm. Panama . . . . . *adamsi* Bartsch
- \*\* Axial riblets strong on base and in umbilicus only; diam., 2.42  
mm. Gulf of Calif. . . . . *lowei* B. H. and S.

*Key to west American species of the genus Circulus*

- A single spiral keel on the periphery; diam., 2.2 mm. Panama . . . *diomedæ* Bartsch
- One spiral keel on periphery, one on the spire; diam., 1 mm.  
Mazatlan . . . . . *planospiratus* Carpenter
- One spiral keel below suture, one on base; diam., 1.5 mm.  
Panama . . . . . *modestus* Adams
- One spiral keel on periphery, two on base; diam., 1.2 mm. Ma-  
zatlan . . . . . *annulatus* Carpenter
- One spiral keel on periphery, one on spire, one on base
  - \* Umbilicus bordered with callus wash; diam., 2.69 mm. Tres  
Marias Islands . . . . . *madreënsis* B. H. and S.
  - \* Umbilicus region not calloused; diam., 2.5 mm. Panama . . . *valvatoïdes* Adams
- Two spiral keels on periphery, two on base; diam., 0.85 mm.  
Mazatlan . . . . . *cinctus* Carpenter
- Three spiral keels on periphery only
  - \* Upper keel visible on spire; diam., 1.8 mm. Panama . . . *tricarinatus* Adams
  - \* Upper keel not visible on spire; diam., 1.6 mm. La Paz . . . *liriope* Bartsch
- Four equally spaced keels on body whorl
  - \* Interspaces with fine spiral striae; diam., 2.5 mm. Cedros Island  
. . . . . *cerrosensis* Bartsch
  - \* Interspaces smooth; diam., 2.5 mm. Catalina Island . . . . . *cosmius* Bartsch
- Five spiral keels on the body whorl; diam., 0.75 mm. Mazatlan  
. . . . . *carinulatus* Carpenter
- Six spiral keels on the body whorl; diam., 1.3 mm. Mazatlan  
. . . . . *bifrontius* Carpenter



27. *Cyclostrema diegensis* Bartsch

*Cyclostrema diegensis* BARTSCH, Proc. U. S. Nat. Mus., vol. 32, 1907, p. 172, text figs. 7, a, b, c.—OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci., vol. 2, pt. 3, 1927, p. 220, pl. 107, fig. 7, 8, 9.

A single immature specimen, taken in about three fathoms at the northeast anchorage, Monserrate Island, Gulf of California, seems to fall here. However, this large extension of range should not be accepted without further confirmatory collecting. Dall (Bull. 112, U. S. N. M., 1921, p. 182) gives the range as San Diego, California.

28. *Cyclostrema exigua* (C. B. Adams)

Plate 21, figures 10, 11, 12

*Vitrinella exigua* C. B. ADAMS, Cat. Panama Shells. Ann. Lyc. Nat. Hist. New York, vol. 5, 1852, pp. 408-409, 539 (separate pp. 184, 185).—CARPENTER, Cat. Mazatlan Shells, 1857, pp. 243, 244.

Six specimens from Cape San Lucas, Lower California, agree well with Adams' and Carpenter's descriptions.

29. *Cyclostrema lowei* Baker, Hanna and Strong, new species

Plate 20, figures 1, 2, 3

Shell rather small, depressed above, white; nuclear whorls about  $1\frac{1}{2}$ , smooth, mammillate, very slightly convex, but with distinct sutures; postnuclear whorls a little more than one, increasing very rapidly both laterally and vertically, especially in the last quarter turn, with spiral sculpture very indistinct at first, but showing toward the aperture five strong spiral keels, one carinating the periphery, three above this and quite close, and a fifth more distinct and equally close to the slightly impressed suture, the last marked by low tubercles, elongated spirally, from which indistinct, axial ribs extend retractively across the intercostal space and over the next succeeding keel, producing minute tubercles at the intersections; base marked by a low, indistinctly tuberculate, spiral keel, about half way between the periphery and the edge of the umbilicus, from which a series of axial ribs extend into the umbilicus, enlarging as they dip over the sharply rounded edge of the whorl, producing from 20 to 30 distinct teeth; umbilicus contained about  $4\frac{1}{2}$  times in the greatest diameter, perspective showing the rather sharp edges of the whorls within; aperture not very oblique, nearly circular, with an entire peristome expanding in the columellar region. Greatest diameter, 2.42 mm.; least diameter, 1.71 mm.; altitude, 1.48 mm.

*Holotype*: No. 5461, C. A. S. Paleo. Type Coll., with one additional mature and five immature specimens from **Cape San Lucas, Lower California**; collected by G. D. Hanna and E. K. Jordan, June, 1925. Four much worn shells were taken at Espiritu Santo Island, Gulf of California, in 1921.

The species is possibly nearest to *C. miranda* Bartsch,<sup>8</sup> in the basal keel, and the form of the perspective umbilicus showing the preced-

<sup>8</sup> Proc. U. S. Nat. Mus., vol. 39, 1911, p. 230, pl. 39, figs. 1-3.

ing whorls within, but differs markedly in the distribution of the upper keels, and in the distinct teeth within the umbilicus. All of the specimens are beach worn, and it is probable that living shells would show the sculpture to be very much stronger, with a possibility that the axial ribs extend over the whole shell. One immature specimen shows such axial sculpture more marked than growth lines on all the intercostal spaces. It is also probable that the type is not quite mature, but the rapid enlargement of the last whorl in the last quarter turn indicates near maturity.

The species is named for the late Mr. Herbert N. Lowe.

### 30. *Cyclostrema mariæ* Baker, Hanna and Strong, new species

Plate 21, figures 7, 8, 9

Shell of medium size among the west coast species of the genus, rather depressed, white; nuclear whorls  $1\frac{3}{4}$ , depressed, shining, with indistinct sutures, marked by a central, spiral keel with a concave band on each side; postnuclear whorls  $2\frac{1}{2}$ , the first showing a rather abrupt change of sculpture from that of the nuclear whorls, consisting at first of two slightly diverging keels near the upper suture, with a rather broad, concave space below, the whole whorl marked by very numerous, narrow, arcuate, retractive axial ribs, rather evenly spaced, with narrower interspaces, rendering the keels tuberculate at their intersections; lower portion of the whorl early becoming filled with about five low, tuberculate, spiral cords; main spiral keels on the last whorl five, two near the upper suture, one near the periphery, one at the periphery, carinating it, and marked by about 36 large, low, irregular tubercles, and one bordering the umbilicus, the intervening spaces being filled by smaller, tuberculate, spiral cords, irregularly sized and spaced, the whole surface being also marked by very numerous, slightly arcuate, retractive, axial ribs, more than a hundred appearing on the last whorl; sutures very indistinct, crossed more or less continuously by the axial ribs; umbilicus perspective, funnel-shaped below, showing the whorls within nearly, or quite to the apex, everywhere marked by spiral cords and axial ribs similar to the external sculpture; aperture fractured but evidently subcircular; peritreme continuous, slightly thickened within. Greatest diameter, 2.28 mm.; least diameter, 1.61 mm.; altitude, 1.24 mm.

*Holotype*: No. 5465, C. A. S. Paleo. Type Coll., from **Maria Madre Island, Tres Marias group** off the west coast of Mexico, collected by G. D. Hanna and E. K. Jordan, June, 1925.

The unique holotype is so distinct from all species described from this coast that its description seems warranted.

### 31. *Cyclostrema spiceri* Baker, Hanna and Strong, new species

Plate 20, figures 4, 5, 6

Shell large among the species described from this coast with a slightly elevated spire, shining, translucent, white; nuclear whorls about  $1\frac{1}{2}$ , marked throughout by a narrow, rounded, nearly smooth and shining spiral keel, the remaining portions of the whorls dull white, and dipping concavely to the sutures; postnuclear whorls a little more than two, the first marked by a rapidly broadening extension of the nu-

clear keel, sculptured by close, strong, irregular and irregularly spaced, filose, retractive riblets, and by five, smooth, supplementary keels on each side of the main keel, these keels widening, with the addition of intercalated, granular keels on the last whorl numbering about 16, eight or nine appearing on the rounded base and entering into the rather wide, perspective umbilicus, the spacing being rather even, but wider on the upper surface and narrowing toward the umbilicus; last whorl rather evenly rounded, widening rapidly, everywhere marked between the keels by very fine, retractive, growth lines and a few fine, spiral cords; peristome entire, the margin thin, crenulated by the external sculpture; aperture very oblique, suborbicular, flattened on the columellar side. Greatest diameter, 3.97 mm.; least diameter, 2.93 mm.; altitude, 2.2 mm.

*Holotype*: No. 5462, C. A. S. Paleo. Type Coll., from **Coyote Bay, Concepcion Bay, Lower California**, in about two fathoms; collected by Fred Baker, 1921.

The species resembles *C. baldrigei* Bartsch<sup>9</sup> in size, but is differently sculptured. It is larger and more depressed than *Vitrinella decussata* Carpenter,<sup>10</sup> and the decussations are much more limited and less distinct.

It is named for Mr. V. D. P. Spicer of the U. S. S. *Medusa*, known especially for his extensive collections in Samoa.

### 32. *Cyclostrema xantusi* Bartsch

*Cyclostrema xantusi* BARTSCH, Proc. U. S. Nat. Mus., vol. 32, 1907, pp. 171, 172, text figs. 6, a, b, c.

A single specimen, taken in about two fathoms at the northeast anchorage, Monserrate Island, Gulf of California, and four, taken at Cape San Lucas, Lower California, agree well with the description and figures.

### 33. *Circulus cerrosensis* Bartsch

*Circulus cerrosensis* BARTSCH, Proc. U. S. Nat. Mus., vol. 32, 1907, pp. 173, 174, text figs. 9, a, b, c.

Single specimens agreeing well with Bartsch's description and figures were taken at the northeast anchorage, Monserrate Island, in three fathoms, and at Amortajada Bay, San Jose Island in about two fathoms, Gulf of California; and at San Luis Gonzaga Bay, Lower California, in about four fathoms.

<sup>9</sup> Proc. U. S. Nat. Mus., vol. 39, 1911, pp. 229, 230, pl. 30, figs. 7, 8, 9.

<sup>10</sup> Cat. Mazatlan Shells, 1857, p. 239.

34. *Circulus madreënsis* Baker, Hanna and Strong,  
new species

Plate 23, figures 1, 2, 3

Shell of medium size among the species of this coast, depressed, with a low spire, everywhere marked by strong growth lines, becoming very strong in the umbilical region, shining, white; nuclear whorls nearly  $2\frac{1}{2}$ , very slightly convex, but with well defined sutures, nearly smooth, the transition to postnuclear sculpture very indistinct; postnuclear whorls nearly two, everywhere sculptured with spiral keels, rather sharp on the upper and peripheral surface, but rounded below, beginning indistinctly on the first whorl and increasing by intercalation, three more prominent appearing on the last whorl, one on the periphery, one above this and a little nearer to it than to the suture, with a third at about one-fourth the distance between the peripheral keel and the umbilicus, with eight less prominent cords between the suture and the first main keel, two between this and the peripheral keel, two less distinct between this and the basal keels, and about 18 irregular and irregularly spaced, low, rounded, spiral cords between the basal keel and the umbilicus; umbilicus perspective, showing all the whorls inside, surrounded by a flaring, funnel-shaped depression extending over three-quarters of the base, this depression being partially covered by a thin callus, extending from the basal lip about two-thirds around the base of the shell and slightly into the umbilicus, this callus marked by a part of the spiral basal cords and by very strong enlargements of the growth lines dipping into the umbilicus; last whorl rather sharply descending for about one-sixth of the last turn; aperture very oblique, suborbicular; peritreme continuous through a very thin callus on the parietal wall; outer lip thin, crenulated by the external sculpture; parietal wall showing the extension of the external sculpture well within the aperture through its thin callus. Greatest diameter, 2.69 mm.; least diameter, 2.06 mm.; altitude, 1.35 mm.

*Holotype*: No. 5469, C. A. S. Paleo. Type Coll., with one mature and six additional immature specimens from **Maria Madre Island, Tres Marias group** off west coast of Mexico; collected by G. D. Hanna and E. K. Jordan, June, 1925.

The species differs from all others described from this coast in its sculpture and especially in the character of the basal and umbilical callus, which is as distinctively sculptured as any portion of the shell. However, the immature specimens show this umbilical callus only slightly or not at all, the umbilicus being large, open and perspective, and the prominent keels are not much more developed than the others.

35. *Delphinoidea granti* Baker, Hanna and Strong, new species

Plate 22, figures 4, 5, 6

Shell large, somewhat globose, but flattened above, everywhere marked by very prominent, retractive, more or less arcuate or sinuous growth lines, subdiaphanous, shining, white; nuclear whorls nearly two, depressed, marked by a subcentral, spiral cord with a shallow groove on each side between it and the sutures; postnuclear whorls about  $2\frac{1}{2}$ , the separation from the nuclear whorls being rather indistinct, with two rather broad, spiral keels, one at the lower suture and one half way between it and the summit, with broader interspaces showing in the first whorl,

increased on the last whorl to about 36 narrow, prominent, subequal, but unequally spaced, spiral cords extending from the suture to, and into the umbilicus; interspaces marked by strong, retractive growth lines, distinctly arcuate or sinuous in places; last whorl increasing very rapidly, slightly flattened above, broadly convex below, slightly descending near the aperture and nearly free from the parietal wall, being attached only near the suture; sutures consisting of a very narrow, impressed groove; aperture large, very oblique, subcircular, with a slightly entering convexity on the parietal side; lips thin, crenulated by the external sculpture; peritreme continuous; umbilicus perspective but rather narrow, with the spiral threads showing nearly to the apex. Greatest diameter, 5.09 mm.; least diameter, 3.52 mm.; altitude 2.98 mm.

*Holotype*: No. 5468, C. A. S. Paleo. Type Coll., and one additional shell, from **Cape San Lucas, Lower California**; collected by G. D. Hanna and E. K. Jordan June, 1925.

The species perhaps resembles *Cyclostremella dalli* Bartsch<sup>11</sup> as much as any of the family from this coast but it is more globose, much larger for the same number of whorls and the umbilicus is much narrower.

The species is named for Dr. U. S. Grant IV, Associate Professor of Paleontology, University of California at Los Angeles.

### 36. *Delphinoidea lucasana* Baker, Hanna and Strong, new species

Plate 19, figures 10, 11, 12

Shell very small, rather depressed, everywhere marked by distinct growth lines, transparent, shining, white; nuclear whorls  $1\frac{1}{2}$ , minute, nearly smooth, convex, separated by a distinct suture; postnuclear whorls two, the first, narrow, and showing the beginnings of minute, indistinct spiral threads near each suture, with a narrow, nearly smooth space between, the second enlarging rapidly horizontally and vertically, showing indistinct extensions of the spiral cords, and an extension of the clear space to the outer lip, with fairly well-defined additions to the lower group reaching nearly to the middle of the base; remainder of the base marked by obsolescent spiral threads nearly to the umbilical edge; umbilicus perspective, showing the well-rounded whorls nearly or quite to the apex; aperture nearly circular, peristome continuous, spreading in a well-defined callus in the columellar region; lips thin, showing the external sculpture within. Greatest diameter, 1.54 mm.; least diameter, 1.12 mm.; altitude, .78 mm.

*Holotype*: No. 5460, C. A. S. Paleo. Type Coll., and four additional specimens from Cape San Lucas, Lower California; collected by G. D. Hanna and E. K. Jordan, June, 1925.

The species somewhat resembles *Vitrinella ponceliana* de Folin,<sup>12</sup> which evidently belongs to the genus *Delphinoidea*, but that species seems to be more heavily sculptured, and to have the spiral threads much more discrete and extending over the whole shell. The four

<sup>11</sup> Proc. U. S. Nat. Mus., vol. 39, p. 232, pl. 40, fig. 10-12.

<sup>12</sup> Les Molléagrinicoles, 1867, p. 51, pl. 5, fig. 7.

shells mentioned are all less mature, but all follow rather closely the sculpturing of the holotype, with some variation in the width of the two groups of spiral threads. All show the clear space between the two groups of threads and all show the obsolescence of the threads on the umbilical portion of the base. The threads are so indistinct in some specimens that they can be recognized only in groups.

37. *Delphinoidea spiritualis* Baker, Hanna and Strong,  
new species

Plate 21, figures 1, 2, 3

Shell minute, moderately elevated, with indistinct growth lines, translucent, white; nuclear whorls about  $1\frac{1}{4}$ , smooth; postnuclear whorls three, the first enlarging very slightly, the last two rather rapidly, the first showing three rather broad, rounded, spiral threads, the second five, the last about 15, nearly even and evenly spaced, with interspaces about half as broad as the threads, the threads extending over the base and showing on the separate whorls within the funnel-shaped perspective umbilicus; sutures moderate; aperture sub-circular, showing the external sculpture within, but at no point showing a distinct keel; peristome continuous, scarcely straightened or thickened on the columellar portion. Greatest diameter, 1.20 mm.; least diameter, 1.01 mm.; altitude .97 mm.

*Holotype*: No. 5463, C. A. S. Paleo. Type Coll., and two additional specimens, were taken at **Espiritu Santo Island, Gulf of California** by Fred Baker in 1921.

The species seems most like "*?Circulus*" *rossellinus* Dall, from the Coronados Islands near San Diego, California, but, so far as can be judged from the meager description, it is smaller for the same number of whorls, more elevated and probably has fewer spiral threads.

38. *Delphinoidea stephensæ* Baker, Hanna and Strong,  
new species

Plate 21, figures 4, 5, 6

Shell small, scarcely depressed, with indistinct growth lines, translucent, white; nuclear whorls  $1\frac{1}{2}$ , rather prominent, smooth and shining; postnuclear whorls about  $2\frac{1}{2}$ , everywhere marked by minute, narrow, rounded, spiral threads, with narrower interspaces, all nearly equal and equally spaced; first turn showing about nine threads, second about 15, and the last about 50; sutures deeply impressed; aperture subcircular, with a slight convexity at the well rounded parietal wall, showing the external sculpture very distinctly within; umbilicus narrow but perspective, showing at least two turns within. Greatest diameter, 1.66 mm.; least diameter, 1.32 mm.; altitude, 1.60 mm.

*Holotype*: No. 5464, C. A. S. Paleo Type Coll., from **Maria Madre Island, Tres Marias group** off the west coast of Mexico; collected by G. D. Hanna and E. K. Jordan, June, 1925.

This form resembles *D. spiritualis* of this paper, but is more globose, has a narrower umbilicus and many more spiral threads.

The species is named for Mrs. Kate Stephens of the San Diego Society of Natural History.

39. *Scissilabra monile* (Carpenter)

Plate 19, figures 7, 8, 9

*Vitrinella monile* CARPENTER, Cat. Mazatlan Shells, 1857, p. 240.—TRYON, Man. Conch., vol. 10, 1887, p. 102, pl. 34, fig. 37.

A single specimen taken at Coronados Island, Gulf of California, agrees with Carpenter's description, in which he notes the peculiar sinuation of the lip, characteristic of *Scissilabra*.

40. *Teinostoma amplexans* Carpenter

Plate 23, figures 4, 5, 6

*Teinostoma amplexans* CARPENTER, Cat. Mazatlan Shells, 1857, pp. 253, 254.—TRYON, Man. Conch., vol. 10, 1887, p. 104, pl. 35, fig. 60, 61.—See also Pilsbry's discussion of *Ethalia* and *Teinostoma*, Man. Conch., vol. 11, pp. 457, 458.

Taken at Cape San Lucas; La Paz, in three to four fathoms; Coyote Bay, Concepcion Bay, in two fathoms, Puerto Escondido, in three fathoms, all of Lower California; west anchorage, San Jose Island, and Isthmus Bay, Espiritu Santo Island, Gulf of California.

41. *Teinostoma regularis* (C. B. Adams)

Plate 22, figures 1, 2, 3

*Vitrinella regularis* C. B. ADAMS, Cat. Panama Shells. Ann. Lyc. Nat. Hist., New York, vol. 5, 1852, pp. 412, 540 (separate p. 188).

Two shells, one only half grown, taken at Maria Madre Island, Tres Marias group, fit closely the meager description of a single shell taken at Panama.

## PLATE 17

Fig. 1. *Cerithium uncinatum* (Gmelin). Plesiotype, No. 5439, (C. A. S.), Maria Madre Island, Mexico. Length, 25.5 mm.; diameter, 12.5 mm.; p. 226.

Fig. 2. *Cerithium maculosum* Kiener. Plesiotype, No. 5440, (C. A. S.), San Francisco Island, Gulf of California. Length, 46 mm.; diameter, 20.5 mm.; p. 225.

Fig. 3. *Cerithium stercus-muscarum* Valenciennes. Plesiotype, No. 5441, (C. A. S.), San Luis Island, Gulf of California. Length, 29 mm.; diameter, 13.5 mm.; p. 226.

Fig. 4. *Cerithidea albonodosa* Carpenter. Plesiotype, No. 5447, (C. A. S.), San Luis Gonzaga Bay, Gulf of California. Length, 31 mm.; diameter, 12.7 mm.; p. 227.

Fig. 5. *Clava gemmata* (Hinds). Plesiotype, No. 5442, (C. A. S.), Maria Madre Island, Mexico. Length, 30 mm.; diameter, 11.5 mm.; p. 226.

Fig. 6. *Potamides sculptus* (Sowerby). Plesiotype, No. 5443, (C. A. S.), San Marcos Island, Gulf of California. Length, 19.5 mm.; diameter, 7 mm.; p. 227.

Fig. 7. *Cerithium alboliratum* Carpenter. Plesiotype, No. 5425, (C. A. S.), Cape San Lucas, Lower California. Length, 3.8 mm.; diameter, 1.4 mm.; p. 225.



PLATE 18

Fig. 1. *Cerithidea montagnei* (d'Orbigny). Plesiotype, No. 5444, (C. A. S.), San Ignacio Lagoon, Lower California. Length, 31 mm.; diameter, 14.5 mm.; p. 227.

Fig. 2. *Cerithidea montagnei* (d'Orbigny). Plesiotype, No. 5445, (C. A. S.), San Ignacio Lagoon, Lower California. Length, 47.5 mm.; diameter, 15.5 mm.; p. 227.

Fig. 3. *Cerithidea fortiuscula* (Bayle). Plesiotype, No. 5446, (C. A. S.), Las Animas Bay, Lower California. Length, 22 mm.; diameter, 8.7 mm.; p. 228.

Fig 4. *Metaxia convexa* (Carpenter). Plesiotype, No. 5448, (C. A. S.), Maria Madre Island, Mexico. Length, 2.82 mm.; diameter, .79 mm.; p. 224.

Fig. 5. *Seila assimilata* (C. B. Adams). Plesiotype, No. 5450, (C. A. S.), Maria Madre Island, Mexico. Length, 6.4 mm.; diameter, 1.62 mm.; p. 223.

Fig. 6. *Cerithiopsis kinoi* Baker, Hanna & Strong., n. sp. Holotype, No. 5451, (C. A. S.), Cape San Lucas, Lower California. Length, 3.25 mm.; diameter, .99 mm.; p. 221.

Fig 7. *Cerithiopsis subgloriosa* Baker, Hanna & Strong, n. sp. Holotype, No. 5453 (C. A. S.), Amortajada Bay, San Jose Island, Gulf of California. Length, 3.93 mm.; diameter, 1.19 mm.; p. 218.

Fig. 8. *Metaxia diadema* Bartsch. Plesiotype, No. 5449, (C. A. S.), Lower California. Length, 6.4 mm.; diameter, 1.8 mm.; p. 224.



## PLATE 19

Fig. 1. *Cerithiopsis pupiformis* Carpenter. Plesiotype, No. 5454, (C. A. S.), Cape San Lucas, Lower California. Length, 1.77 mm.; diameter, .78 mm.; p. 218.

Fig. 2. *Cerithiopsis porteri* Baker, Hanna & Strong, n. sp. Holotype, No. 5455, (C. A. S.), Gulf of California. Length, 2.17 mm.; diameter, .596 mm.; p. 222.

Fig. 3. *Cerithiopsis tuberculoides* Carpenter. Plesiotype, No. 5456, (C. A. S.), Cape San Lucas, Lower California. Length, 2.39 mm.; diameter, .83 mm.; p. 219.

Fig. 4. *Cerithiopsis bristolæ* Baker, Hanna & Strong, n. sp. Holotype, No. 5457, (C. A. S.), Cape San Lucas, Lower California. Length, 1.17 mm.; diameter, .89 mm.; p. 219.

Fig. 5. *Cerithiopsis cassi* Baker, Hanna & Strong, n. sp. Holotype, No. 5458, (C. A. S.), Cape San Lucas, Lower California. Length, 1.99 mm.; diameter, 1.03 mm.; p. 220.

Fig. 6. *Cerithiopsis kinoi* Baker, Hanna & Strong, (subspecies?) Plesiotype, No. 5452, (C. A. S.), Cape San Lucas, Lower California. Length, 2.04 mm.; diameter, .83 mm.; p. 222.

Figs. 7, 8, 9. *Scissilabra monile* (Carpenter). Plesiotype, No. 5459, (C. A. S.), Coronados Island, Gulf of California. Diameter, 1.12 mm.; altitude, .87 mm.; p. 239.

Figs. 10, 11, 12. *Delphinoidea lucasana* Baker, Hanna & Strong, n. sp. Holotype, No. 5460 (C. A. S.), Cape San Lucas, Lower California. Diameter, 1.54 mm., altitude, .78 mm.; p. 237.

PLATE 20

Figs. 1, 2, 3. *Cyclostrema lowei* Baker, Hanna & Strong, n. sp. Holotype No. 5461, (C. A. S.), Cape San Lucas, Lower California. Diameter, 2.42 mm.; altitude, 1.48 mm.; p. 233.

Figs. 4, 5, 6. *Cyclostrema spiceri* Baker, Hanna & Strong, n. sp. Holotype, No. 5462, (C. A. S.), Coyote Bay, Concepcion Bay, Gulf of California. Diameter, 3.97 mm.; altitude, 2.2 mm.; p. 234.

PLATE 21

Figs. 1, 2, 3. *Delphinoidea spiritualis* Baker, Hanna & Strong, n. sp. Holotype, No. 5463, (C. A. S.), Espiritu Santo Island, Gulf of California. Diameter, 1.20 mm.; altitude, .97 mm.; p. 238.

Figs. 4, 5, 6. *Delphinoidea stephensæ* Baker, Hanna & Strong, n. sp. Holotype, No. 5464, (C. A. S.), Maria Madre Island, Mexico. Diameter, 1.66 mm.; altitude, 1.60 mm.; p. 238.

Figs. 7, 8, 9. *Cyclostrema mariæ* Baker, Hanna & Strong, n. sp. Holotype, No. 5465, (C. A. S.), Maria Madre Island, Mexico. Diameter, 2.28 mm.; altitude, 1.24 mm.; p. 234.

Figs. 10, 11, 12. *Cyclostrema exigua* (C. B. Adams). Plesiotype, No. 5466, (C. A. S.), Cape San Lucas, Lower California. Diameter, 1.82 mm.; least diameter, 1.3 mm.; altitude, 1.16 mm.; p. 233.

## PLATE 22

Figs. 1, 2, 3. *Teinostoma regularis* (C. B. Adams). Plesiotype, No. 5467, (C. A. S.), Maria Madre Island, Mexico. Diameter, 2.03 mm.; least diameter, 1.44 mm.; altitude, 1.19 mm.; p. 239.

Figs. 4, 5, 6. *Delphinoidea granti* Baker, Hanna & Strong, n. sp. Holotype, No. 5468, (C. A. S.), Cape San Lucas, Lower California. Diameter, 5.09 mm.; altitude, 2.98 mm.; p. 236.

## PLATE 23

Figs. 1, 2, 3. *Circulus madreënsis* Baker, Hanna & Strong, n. sp. Holotype, No. 5469, (C. A. S.), Maria Madre Island, Mexico. Diameter, 2.69 mm.; altitude, 1.35 mm.; p. 236.

Figs. 4, 5, 6. *Teinostoma amplexans* Carpenter. Plesiotype, No. 5470, (C. A. S.), La Paz, Lower California. Diameter, 2.55 mm.; least diameter, 1.80 mm.; altitude, 1.20 mm.; p. 239.